10. Direct Development in a Dromiid Crab.

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[Received February 10, 1922; Read March 7, 1922.]

(Text-figures 1–3.)

The specimen here described is in the collection of the British Museum (Natural History), and was submitted to me for examination by the the kindness of Dr. W. T. Calman, to whom thanks are also due for much assistance in studying it. The specimen was presented to the Museum many years ago by the late Dr. Henry Woodward. It is dried, and the only information regarding its origin is the locality, "Bass's Strait," given on the label.

The specimen is an adult female *Petalomera lateralis* (Gray)†, a species referred to by Haswell ‡ as "very common" in Australian seas.

Under the abdomen are carried about 20 young in a post-larval stage, which, although possessing the same general form as the adult, differs from it in many details.

A similar occurrence is recorded by Miss Rathbun § in a paper to this Society in the case of the Oxyrhynch *Naxioides serpulifera* (Guérin); this is the only other available record of such a case among marine Brachyura.

The adult agrees entirely with the descriptions, and the figure of Stimpson ‖. It is figured here for comparison with the young.

Only one stage of development has been observed in this case, not two as in the case of *N. serpulifera*.

The carapace of the young crab is longer than broad, the measurements being about 1·5 mm. long and 1·2 mm. broad, is flatly convex, much flatter than in the adult, and in the centre shows, under a high magnification, a minute reticulation. The regions are well marked, again in contrast to the adult, and there are numerous very fine hair-like spines on the upper surface.

The front consists of three very prominent forwardly directed spines, each of which bears 5 to 8 pointed spinelets. The middle spine is directed forward and downward and, with the two lateral spines, forms a deep, almost V-shaped gutter between the supra-orbital borders, the opening of the V pointing forwards (text-fig. 1).

The supra-orbital border bears a similar prominent spine with accessory spinelets, which is directed forward and outward (text-fig. 1, *a*). Behind this spine the border runs almost directly backwards; there is a slight protuberance bearing a few spinelets

* Communicated by Dr. W. T. Calman, F.R.S., F.Z.S.

† For the transference of this species from *Cryptodromia* to *Petalomera*, *cf.* L. A. Borradaile, Ann. Mag. Nat. Hist. (7) xi. 1903, p. 300.

‡ W. A. Haswell, Catalogue of Aust. Stalk- and Sessile-eyed Crustacea, 1882, p. 139.

§ Mary J. Rathbun, Proc. Zool. Soc. 1914, p. 653, pl. ii. figs. 9, 10.

‖ W. Stimpson, Smithsonian Misc. Coll. 1907, xlix. pl. xx. fig. 3.

about the middle of its length (text-fig. 1, *b*), opposite which is the eyestalk. The border then turns almost at right angles laterally and ends in a prominent tooth, covered with spinelets, forming the post-ocular tooth of the young specimen (text-fig. 1, *c*).

On the lateral border, behind this, another strong tooth bearing spinelets occurs before the cervical groove is reached. Directly posterior to the groove is another similar spine, which is not so strongly marked.

No subhepatic tooth can be discerned.

In the adult there are two teeth on the antero-lateral border; of these, the most anterior (text-fig. 2, *c*) must represent the post-ocular tooth of the young. The adult post-ocular tooth (text-fig. 2, *b*) may represent either the protuberance on the supra-orbital border of the young, opposite the eyestalk; in this case, the sub-hepatic tooth is a later development, and the prominent anterior supra-orbital tooth of the young (text-fig. 1, *a*) must become reduced to the weakly developed supra-orbital tooth of the adult (text-fig. 2, *d*); or, alternatively, the eye in the adult may have passed even more anteriorly, so that the post-ocular tooth of the adult would represent the anterior supra-orbital tooth of the young, In this case, the adult supra-orbital tooth would be a new structure, developed from the spines in the region, and the sub-hepatic tooth may arise from the protuberance on the supra-orbital border opposite the eyestalk.

The chelæ in the adult bear on the carpus a strongly marked tooth (text-fig. 2, *e*) on the external angle, a small bluntly rounded tooth (*f*) forming the extremity of the upper border, and between them a very strong forwardly directed tooth (*g*) forming the most anterior part of the carpus. Posteriorly, on the outer border of the carpus are two ridgelike teeth (*h*) standing close together. In the young (text-fig. 3), the first three teeth are represented by weakly developed protuberances, but no sign can be distinguished of the two ridgelike teeth.

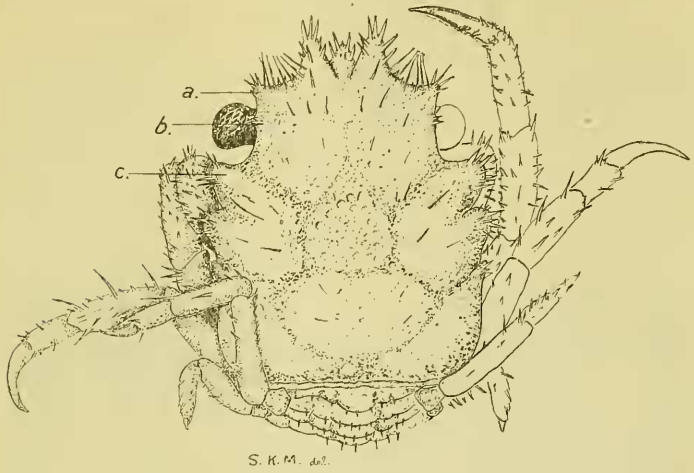
The hand of the young is smooth, except for a few small spines and hairs. The movable finger on its outer margin bears five sharp teeth, excluding that at the tip (text-fig. 3); there is an indication of a sixth tooth behind. The fixed finger bears four sharp teeth, with a fifth poorly developed, again excluding the apical tooth. In the adult, the teeth of the fingers are exactly similar, with the exception that they are slightly blunter, and that the posterior poorly developed teeth are slightly more prominent. The hand of the adult is grooved on both sides towards each finger to receive the thick tomentum which in life covers the carapace and the greater part of the limbs; this grooving, though typical in the Dromiids as a whole, is not present in the young.

The only description of the development of a Dromiid which is available is that of *Dromia vulgaris* by Cano * in 1894. According to him, the crab is hatched from the egg in a zoea stage, from which a metazoea develops; this is followed by a

* G. Cano, Atti del Accad. Sci. Soc. Reale Napoli, ser. ii. vol. vi. 1894, No. 2, pls. i. & ii.

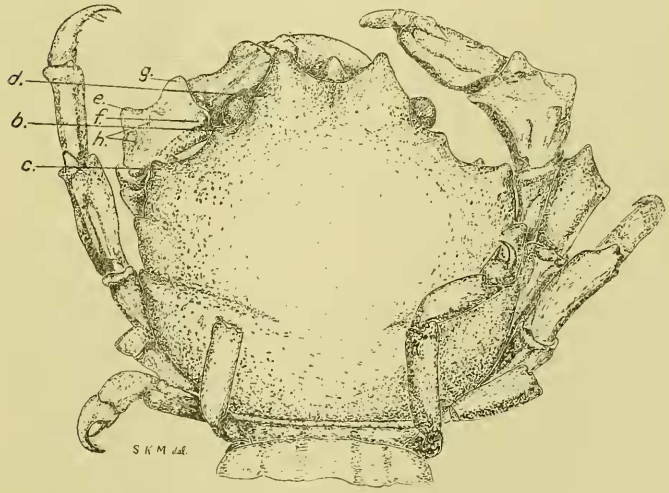
megalopa stage 5 mm. in length. Cano then describes a post-larval stage, hardly differing from the adult, except for the supra-orbital spines and the middle spine of the rostrum which are not yet developed.

Text-figure 1.



Petalomera lateralis Gray. Post-larval stage. × 25.

Text-figure 2.



P. lateralis; adult female. × 3.

The specimens here described look most like the megalopa of Cano, but are considerably more advanced.

The antennules (internal antennæ of Cano) are exactly similar to those of the adult, consisting of a peduncle of three joints and a

flagellum, which appears to be double, but owing to the brittleness of the dried specimen this could not be determined with certainty.

The antennæ consist of four joints, so far as can be made out, with a squame and a flagellum, the squame being rudimentary and similar to that in Cano's figure.

Text-figure 3.

Cheliped of post-larval stage.

The abdomen is not extended and folded at the tip as in the megalopa figured by Cano, but is tucked beneath the body in typically Brachyurous manner. It bears four pairs of pleopods similar to those of the adult; the telson is also like that of the adult, there being simply a trace of the sixth pleopod visible between the 6th and 7th segments, and not, as in Cano's megalopa, a distinct ramus on either side.

The last two pairs of legs are distinctly cheliform, and not weakly subchelate, as in the megalopa.

Sternal grooves cannot be distinguished in the young, nor can it be seen whether there is an epipodite on the cheliped.

The young in this case are definitely post-larval, and the growth-changes which occur before reaching maturity are (*a*) the broadening of the carapace until it is broader than long, (*b*) the forward movement of the eye, (*c*) the effacing of the grooves between the regions of the carapace, (*d*) the thickening of the legs and chelipeds, and (*e*) the appearance of ridges on them. The thorns and spinules of the young are generally absent in the adult, which, on the other hand, in life was covered with a short tomentum, which is not seen in the young.

It is very extraordinary that in a well-known species such as this, no record should hitherto have been made of the direct development of a post-larval stage from the egg. The possibility that the larvæ have hatched from the egg, and passed through zoea, metazoea and megalopa stages clinging to the pleopods under the abdomen of the female, may be ruled out for the reason that it would be impossible for an adequate food-supply to be maintained. And, in fact, no record has been found of *P. lateralis* or *N. serpulifera* having been captured with eggs, though this is a common occurrence with other Oxyrhynchs and Dromiids, numerous examples being recorded in the collections both of the 'Sealark' * and the Ceylon Pearl Oyster Commission †.

* Mary J. Rathbun, Trans. Linn. Soc. London, (2) Zool. xiv. pt. 2, 1911, p. 191 sqq.

† R. Douglas Laurie, Herdman's Rep. Ceylon Pearl Oyster Fish. (Royal Soc., London) v. 1906, p. 349 sqq.